

## **Annual Report, 2000-2001**

### **NOAA Award No. NA96GP0240: California Fishery, Farm and Environmentally-Vulnerable Community Responses to the 1997-98 ENSO Event**

PI: Ronnie D. Lipschutz

Co-PI: Caroline Pomeroy

Over the past year, we have completed a number of tasks discussed in our last progress report (April 2000), conducted additional archival research and pilot interviews, and initiated full-scale interviews with members of the farming, fishing, and residential groups of interest, as well as agency personnel. In pursuing these activities, we have gained both methodological and substantive insights for the project, as well as new data to inform our research questions.

As we noted in our recent request for a no-cost time extension, our research is proceeding smoothly but, for a variety of reasons, our interview schedule has been delayed by approximately six months. This delay is due in part to difficulties encountered in scheduling interviews with farmers and fishers, whose operating schedules tend to be rather intensive for most of the year. In addition, following our pilot interviews, we found it necessary to rethink and reframe some of the propositions we put forth in our original proposal to NOAA. Finally, we have had unexpected personnel problems; specifically, we have not been able to hire competent graduate students with bilingual capability, and have instead hired undergraduates and recent graduates from UCSC. These research assistants have required additional training and preparation for fieldwork, and we have ended up being on call for more fieldwork than anticipated.

Tasks listed in last year's report and completed include:

*Task 1: Collection of MBR weather and oceanographic data on ENSO-related parameters and development of a "hazard scale" to pinpoint research sites around the MBR.*

*Task 2: Collection of ENSO forecasts for 1997-98 issued by public media and agency sources, as well as reports on consequences of storms, to determine how the information therein was mediated and transformed by the communication process.*

*Task 3: Identification of specific sites, relevant agencies and staff, and affected individuals, groups and communities, using anecdotal data, media reports and other archival information, as well as our own contacts and those of colleagues knowledgeable of each sector of interest.*

*Task 4: Pilot interviews with agency personnel and affected individuals.*

*Task 5: Analysis of Year 1 data and modification of research strategy for Year 2.*

Tasks still in progress include:

*Task 6: Semi-structured interviews with a broad range of agency personnel and affected individuals.*

After finalizing pilot interview schedules and protocols, we interviewed 14 individuals drawn from our subject groups, and conducted additional informational interviews with five individuals knowledgeable of these groups. Methodologically, we found that a structured survey approach to interviews did not allow us to fully explore the richness and diversity of contexts, experiences, and responses that our informants had to offer. We therefore modified our approach to a more ethnographic one, in which we use a set of more open-ended questions that help to guide the interview while giving us greater access to the complexity of people's decisionmaking and behavior in response to their environmental vulnerabilities. In making this transition, we also found that respondents were more comfortable with the interview process, and more inclined to offer us thoughtful and meaningful information and insights.

Substantively, we have become aware of the following:

1. *There is a distinct contrast between risk and vulnerability, as calculated and acted upon:* individuals and communities understand and anticipate their exposure to hazards in terms of *vulnerability*, and not as a probabilistic likelihood of suffering costs from extreme events. That is, they tend to assess the threat of disaster in terms of past experience of discrete events within their local physical, social and economic context. These events become the metric by which others are measured, and the boundary conditions for the worst that can happen. Obviously, some events will be so extreme that they fall outside of the boundaries of experience; at the same time, events that some would consider extreme are regarded by others as part of the fabric of everyday life.
2. *There is a repertoire of responses to hazards, based substantially on "local knowledge," that is often sui generis to a specific community.* In the course of our work, we have identified, for example, two small flood plain neighborhoods whose response to natural hazards and events has been quite distinct. One has a long-standing homeowners association, the other has only recently established a neighborhood group. Residents in the first have both extensive experience with floods and cooperate closely when one is imminent. Residents of the second neighborhood have similar experience as individuals, but have not had the benefit of shared local knowledge about hazards and floods.
3. *There is an epistemological disjuncture between emergency service agencies and vulnerable communities:* The Santa Cruz County Office of Emergency Services is one of the best-prepared and proactive agencies in the state. Moreover, the County seems to experience more in the way of events than many other counties. As a result, agency personnel are very attentive to all potential risks and hazards, and have detailed plans in place for dealing with them. At the same time, however, much of this knowledge

and practice appears to have a limited impact on vulnerable communities, such as those where we have been conducting interviews. This disjuncture appears to arise because the agency has to deal with generalized “populations,” while individuals act on the basis of what they know and what they have experienced. There is a great deal of “talking past each other” as a result.

*4. Personal and social knowledge is often more important than formal information:* “Local knowledge” is highly social and rooted in at least three sources. Not surprisingly, it draws heavily on individual experience. It also relies on individual experiences communicated through social networks and, especially, structured groups. Finally, it is based on the accumulated “traditions” and rules of social groups which, in this instance, have to do with an understanding of very specific local and even household vulnerability and sensitivity. Externally-provided information can be helpful in setting boundary conditions for hazards and events, but it cannot provide the guidance needed by individuals acting in contingent and contextual situations.

*Task 7: Analysis of data and preparation of project deliverables.*

We have submitted a paper proposal for the meeting of the Human Dimensions of Global Environmental Change conference, to be held in Brazil in October, 2001. The abstract is attached. A monograph outline is also attached.

**Social Knowledge, Experience and External Information:  
Community and Individual Responses to Extreme Weather and Climate Events**

Caroline Pomeroy, Research Scientist  
Institute of Marine Sciences, A316 Earth & Marine Sciences  
University of California, Santa Cruz  
Santa Cruz, CA 95064  
Phone: 831-459-5614/e-mail: cpomeroy@cats.ucsc.edu

Ronnie D. Lipschutz, Associate Professor of Politics  
260 Stevenson College, University of California, Santa Cruz  
Santa Cruz, CA 95064  
Phone: 831-459-3275/e-mail: rlipsch@cats.ucsc.edu

Abstract

The conventional understanding of the relationship between risk and exogenously-provided information is that rational "consumers" will utilize such data to reduce their exposure to medium-probability high-cost events such as El Niños. This NOAA-funded project seeks to test that assumption within a spatially-restricted region and within selected social groups, using in-depth, partially-structured ethnographic interviews. Our research on environmentally vulnerable communities of fishers, farmers and residents of flood-prone areas in Central California's Monterey Bay area suggests that this highly idealized model of the relationships between risk, uncertainty, and "knowledge" suffers from several of methodological and epistemological flaws that should be heeded.

First, although some climate trends and variability can be predicted interseasonally, individual and group vulnerability to extreme events and variation is highly contextual and contingent. It varies among households, farms and fishing operations, alike. Moreover, individuals, groups, and communities rely heavily on "local knowledge" in their efforts to reduce sensitivity to extreme events. Information provided by exogenous experts and authorities on the probabilities of extreme events and associated risks generally pays little or no attention to such context and contingency, so that to be useful, it must be supplemented with local knowledge.

Second, interseasonal predictions can only provide general information about the intermediate-term possibilities of seasonal variability, and not about either the probability or timing of discrete extremes such as severe storm fronts likely to bring flooding or disrupt agriculture. Short-term weather forecasting does provide such knowledge and is more likely to prove useful in reducing sensitivity to extremes. But individuals and groups also possess and practice more generalized strategies to reduce their sensitivity to moderate events without actually acting to eliminate their vulnerability to extreme ones.

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In this paper, we report on our findings in this project, framed by a critical and theoretical examination of the literatures on risk, vulnerability, and social responses to climatic variability and change.

## **Red Sky at Morning: Climate Variability, Natural Hazards, and Local Knowledge**

Caroline Pomeroy & Ronnie Lipschutz

**Chapter 1: Stormy Weather (introduction):** This book is about individuals' responses to risk and uncertainty, especially as it applies to bad weather. It is written as part of a project funded by the Office of Global Programs Human Dimensions Project of the National Oceanic and Atmospheric Administrative (NOAA) of the U.S. Department of Commerce to examine the utility and benefits of interannual climate forecasts to producers and residents in "environmentally-sensitive sectors"—fisheries, agriculture, and vulnerable communities--in the Monterey Bay region of Northern California. Hazards are real; they pose risks to life and limb; people are injured and die. Yet, as many have pointed out, there are frequent mismatches between hazard magnitude and probability and individual and societal perception of risk and uncertainty. Why? The actual frequency of hazards, and the risks associated with them, can be calculated with some degree of uncertainty. But in order to explain variations in responses to technical information about climatic events, it is also essential to understand how individuals perceive risks associated with climate fluctuations and variability, how they obtain and use information in their decision-making, from which sources they obtain it, and how they adjust their behavior, whether an event has had a null or negative effect

**Chapter 2: Risk Society & (Un)Natural Hazards:** The concept of risk itself is a problematic one. These reasons have little to do with quantification or, for that matter, assumptions about individuals as rational actors. Rather, most research into risk assessment and most conclusions about risk perception fail to take into account the social nature of both risk and risk-taker. That is to say that no hazards develop or are perceived as a result of purely objective circumstances. The creation of many hazards, and the recognition of most of them, are a result of social context. According to Palm, "Natural, as opposed to technological, hazards are those triggered by climatic and geological variability, which is at least partly beyond the control of human activity" [1990:3]. Tobin and Montz argue, further, that "A natural hazard represents the potential interaction between humans and extreme natural events" [1997:5]. They also distinguish between "hazards" and "disasters," defining the former in terms of risk and the latter as "an event that has a large impact on society" [1997:6]. In other words, natural hazards pose risks to humans and their constructed socio-economic systems but are realized in terms of physical impacts only if specific conditions and events converge.

**Chapter 3: Experiencing, Learning, Doing:** How do social individuals decide what to do, especially in the face of uncertainty and structural constraints? The standard answer to this question is that they attempt to acquire information about alternatives, estimate the costs and benefits of different possibilities, choose a particular course of action, assess the outcome as a success or failure, and learn for the future. While this schema does highlight the general approach of rational individuals to decisionmaking and action, it

largely excludes the broader social context within which these take place. When we begin to examine this social context through specific cases, we find that the story is a good deal more complicated and contingent.

**Chapter 4: Living in Troubled Terrains:** This chapter reports on responses to vulnerability and events in two residential areas in the Monterey Bay region, one in the Santa Cruz Mountains, the other in the Pajaro River Valley. Emergency services agencies have detailed plans for dealing with natural hazards; residents have their own. The two do not always agree.

**Chapter 5: Lettuce Prey, Strawberry Shortcuts:** Farming is an activity subject to a wide range of potentially negative influences, of which weather, both short- and long-term is only one. Lettuce and strawberry farmers in the Monterey Bay region are especially sensitive to climate variability, but they have also developed a set of strategies for coping with uncertainty, both natural and social.

**Chapter 6: Fishing in Stormy Waters:** In recent years, California's fisheries have been the focus of both natural forces and human management. As has long been the case, boat owners and processors have made substantial investments to adapt to both, but increased regulation of fisheries and climate variability have introduced new sources of uncertainty, singly and in concert with one another. Individual and social knowledge, and other endogenous resources provide the foundation of continued adaptation to these challenges.

**Chapter 7: Producing Knowledge, Investing Capital:** On what sources of information about natural hazards do individuals and groups rely? How do they learn about their specific vulnerabilities, especially if there is such great variation over short distances and among socio-economic groups? And what kinds of information and knowledge are most valued, comprehensible and useful: Technical? Heuristic? Experiential? A great deal of research into climatic variability and ENSO has been undertaken over the past decade, and much effort has gone into providing the general public with scientific and technical information about the phenomenon, how it could affect the United States, and what disruptions it could cause. That there remain disputes about the reliability and utility of such research and the predictions that result [Jasanoff and Wynne, 1998] suggests, however, a number of conceptual problems with respect to the utility of technical information.

**Chapter 8: Red Sky at Morning...? (conclusion):** The conventional understanding of the relationship between risk and exogenously-provided information is that rational "consumers" will utilize such data to reduce their exposure to medium-probability high-cost events such as El Niños. Our research on environmentally vulnerable communities of fishers, farmers and residents of flood-prone areas in Central California's Monterey Bay area suggests that the conventional, highly idealized model of the relationships among risk, uncertainty and "knowledge" suffers from several methodological and epistemological flaws that should be heeded.

First, although some climate trends and variability can be predicted interseasonally, individual and group vulnerability to extreme events and variation is highly contextual and contingent. It varies among households, farms and fishing operations, alike. Moreover, individuals, groups and communities rely heavily on “local knowledge” in their efforts to reduce sensitivity to extreme events. Information provided by exogenous experts and authorities on the probabilities of extreme events and associated risks generally pays little or no attention to such context and contingency, so that to be useful, it must be supplemented with local knowledge.

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Finally, “local knowledge” is highly social and rooted in at least three sources. Not surprisingly, it draws heavily on individual experience. It relies as well on individual experiences communicated through social networks. Finally, it is based on the accumulated traditions and rules of social groups which, in this instance, have to do with an understanding of very specific local and even individual vulnerability and sensitivity.